

## Mixed Cropping

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### History of the Ancient Farming Technique



While monocultural fields are lovely and easy to tend, like this wheat field in Washington state, they are susceptible to crop diseases, infestations and droughts without the use of applied chemicals.

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Mixed cropping, also known as polyculture, inter-cropping, or co-cultivation, is a type of agriculture that involves planting two or more plants simultaneously in the same field, interdigitating the crops so that they grow together. In general, the theory is that planting multiple crops at once saves space since crops in the same field might ripen at different seasons, and provides a wealth of environmental benefits. Documented benefits of mixed cropping include the balance of input and outgo of soil nutrients, the suppression of weeds and insect pests, the resistance of climate extremes (wet, dry, hot, cold), the suppression of plant diseases, the increase in overall productivity, and the management of scarce resources (land) to the fullest degree.

## Mixed Cropping in Prehistory

Planting enormous fields with single crops is called monocultural agriculture, and it is a recent invention of the industrial agricultural complex. Most agricultural field systems of the past involved some form of mixed cropping, although unambiguous archaeological evidence of this is difficult to come by. Even if botanical evidence of the plant residues (such as [starches](#) or phytoliths) of multiple crops is discovered within an ancient field, it has proven difficult to differentiate between the results of mixed cropping and rotation cropping. Both methods are believed to have been used in the past.

The primary reason for prehistoric multi-cropping probably had more to do with the needs of the farmer's family, rather than any recognition that mixed cropping was a good idea. It is possible that certain plants adapted to multi-cropping over time, as a result of the domestication process.

### Classic Mixed Cropping: Three Sisters

The classic example of mixed cropping is that of the American "[three sisters](#)": [maize](#), [beans](#), and cucurbits ([squash and pumpkins](#)).

The three sisters were domesticated at different times but eventually were combined together to form an important component of Native American agriculture and cuisine. The mixed cropping of the three sisters is historically documented by the Seneca and Iroquois tribes in the US northeast and probably began sometime after 1000 C.E. The method consists of planting all three seeds in the same hole. As they grow, the maize provides a stalk for the beans to climb on, the beans are nutrient-rich to offset that taken out by the maize, and the squash grows low to the ground to keep weeds down and keep water from evaporating from the soil in the heat.

### Modern Mixed Cropping

Agronomists studying mixed crops have had mixed results determining if yield differences can be achieved with mixed versus monoculture crops. For example, a combination wheat and [chickpeas](#) might work in one part of the world, but it might not work in another. But, overall it appears that measurably good effects result when the right combination of crops are cropped together.

Mixed cropping is best suited for small-scale farming where harvesting is by hand. It has been used to improve income and food production for small farmers and lessen the likelihood of total crop failure—even if one of the crops fail, the same field might still produce other crop successes. Mixed cropping also requires fewer nutrient inputs such as fertilizers, pruning, pest control, and irrigation than does monoculture farming.

## Benefits

There seems to be no doubt that the practice provides a rich [biodiverse](#) environment, fostering habitat and species richness for animals and insects such as butterflies and bees. Some evidence suggests that polycultural fields do produce high yields compared to monocultural fields in certain situations, and almost always increase biomass richness over time. Polyculture in forests, heathlands, grasslands, and marshes has been particularly important for the regrowth of biodiversity in Europe.

A recent study (Pech-Hoill and colleagues) was conducted on the tropical American perennial achiote (*Bixa orellana*), a rapidly growing tree that has a high carotenoid content, and a food dye and spice in small farming cultures in Mexico. The experiment looked at achiote as it is grown in different agronomic systems—intercropped polyculture, backyard cultivation including poultry farming, and a wide range of plants, and monoculture. Achiote adapted its mating system depending on which type of system it was planted in, specifically the amount of outcrossing that is seen. Further research is required to identify the forces at work.